DESIGNATOR & NUMBER: ABT 135

COURSE TITLE: Introduction to Food Microbiology

CREDIT UNITS: 1.5

FACULTY INITIATOR: Larry Adams

SEMESTER HOURS:

<table>
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<tr>
<th>Lecture Contact Hours</th>
<th>Lab Contact Hours</th>
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<td>16.00 - 18.00</td>
<td>24.00 - 27.00</td>
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<th>Total Contact Hours</th>
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<th>Total Out-of-Class Hours</th>
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<th>Total Student Learning Hours</th>
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TOTAL CONTACT HOURS (BASED ON 16-18 WEEKS):

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<th>Lecture</th>
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<th>Lab</th>
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<td>24.00 - 27.00</td>
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<th>By Arrangement Lab Hours (DHR)</th>
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GRADING BASIS:
Grade Only

PREREQUISITE:

COREQUISITE:

ADVISORY:

Introductory course in biology.

OTHER:

COURSE DESCRIPTION:
An introduction to the principles of food microbiology and food safety. Investigation of the beneficial and harmful effects of microorganisms on food. Survey of the types of microbes found in various types of food, as well as methods for their detection. Evaluation of methods of microbial
control and mechanisms of disease of important food microorganisms, as well as sources of food contamination. Examination of implementation and effectiveness of food safety programs. Field trips may be required.

**COURSE OBJECTIVES:**
Upon satisfactory completion of the course, students will be able to

1. review the classification of microbes.
2. distinguish between controlled (fermentation) and uncontrolled (spoilage) biochemical processes.
3. assess the factors that affect microbial growth.
4. examine the prevalence of microorganisms in different types of foods.
5. compare and contrast mechanisms for measuring microbial growth in foods.
6. evaluate methods for controlling microbial growth in foods.
7. analyze mechanisms and symptoms of food borne intoxication and food borne infection.
8. evaluate protective measures and programs designed to improve food safety.

**COURSE CONTENT:**

I. Types and characteristics of microbes
   A. Bacteria
   B. Fungi
   C. Viruses
   D. Protozoans
   E. Helminths
   F. Prions
   G. Viroids

II. Metabolic properties of microbes
   A. Fermentation
   B. Spoilage
   C. Contamination without perceptible change

III. Factors that influence microbial growth
   A. Intrinsic parameters
      1. Moisture
      2. Acidity – alkalinity (pH)
      3. Oxidation – reduction potential
      4. Nutrient content
      5. Antimicrobial constituents
      6. Biological structures
   B. Extrinsic parameters
      1. Storage temperature
      2. Relative humidity
      3. Presence and concentration of gases in the environment
      4. Presence and activity of other microorganisms

IV. Microbial activity in food and beverage production
   A. Dairy products
   B. Pickled products
   C. Fermented meat products
   D. Bread
   E. Alcoholic fermentation
   F. Contribution of molds to food quality
V. Overview of intrinsic microorganisms in foods
   A. Fresh meats and poultry
   B. Processed meats and seafood
   C. Vegetable and fruit products
   D. Other foods

VI. Measuring microbial presence or activity in foods
   A. Culture and sampling methods
   B. Biochemical identification
   C. Molecular identification
   D. Serological identification
   E. Quantitative assays
   F. Bioassays

VII. Controlling microbial growth in foods
   A. Preservation methods
      1. Heat
      2. Cold storage
      3. Drying
      4. pH change
      5. Preservatives
      6. Modified atmospheres
      7. Irradiation
   B. Microbial control in water supply, food preparation areas, and other practices

VIII. Food transmitted pathogens
   A. Bacterial
      1. Salmonella
      2. E. coli O157H7
      3. Listeria
      4. “Emerging” and other bacterial pathogens
   B. Viruses
   C. Protozoans
   D. Helminths
   E. Other

IX. Control of food safety
   A. Indicator organisms
   B. Systems for assessing food safety
      1. HACCP
      2. FSO
      3. Other criteria

LAB CONTENT:

I. Evaluation of safe food handling practices
   A. Hand washing
   B. Equipment cleanliness
   C. Sampling techniques

II. Measurement and transfer

III. Light microscopy and morphological staining

IV. Pure culture technique

V. Isolation from and characterization of microbes in foods

VI. Effect of environmental factors on microbial growth

VII. Control of microbial growth: disinfection, sterilization, antibiotics

VIII. Assessment of contamination of food, water, and utensils

IX. Metabolic properties of microbes
A. In food production
B. In food spoilage

INSTRUCTIONAL METHODOLOGY:
Lecture
Lab Activity
Individual Assistance
Audiovisual (including PowerPoint or other multimedia)
Demonstration
Discussion
Group Activity
Requires a minimum of three (3) hours of work per unit including class time and homework.

METHODS OF EVALUATING OBJECTIVES OR OUTCOMES:
Methods of evaluation to determine if students have met objectives may include, but are not limited to the following:

CLASSROOM       EXPLANATION
Class Activity    Reading assignments and completion of written questions, class participation.
Lab Activity      Laboratory experiments, reports and field notes.
Written Assignments Weekly written assignments outside of class time, exams, lab reports and quizzes.

EXAMS        EXPLANATION
Essay         Midterm and final exams
Comprehensive Final Short written answer and objective questions.
Problem Solving Written homework assignments where students will research a problem and propose alternate solutions. Distinguish between food spoilage and fermentation.
Skill Demonstration Completion of laboratory exercises
Objective Test Midterm and final
Quizzes       Weekly

MINIMUM STUDENT MATERIALS:
Textbook(s) similar to:

Loessner, J. M. Modern Food Microbiology. 7th Ed, Springer, 2006

COURSE ASSIGNMENTS
Examples of Reading Assignments
Course textbook, on line articles and materials.

Examples of Writing Assignments
Written homework assignments, laboratory reports, tests and quizzes.

Examples of Outside Assignments
Questions of weekly reading assignments, research assignments from on line sources. Laboratory
assignments and reports.
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